

fortra™



H1 Chaparral G5312 10-bay Rackmount & Tower Enclosures

Installation Guide
July 16, 2002 • Revision C

Patent Pending

JMR

JMR



Copyright

Copyright ©2000, 2001 by JMR Electronics, Inc. All Rights Reserved. No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the express written permission of JMR Electronics, Inc.

Sales and Ordering Information

JMR Electronics, Inc.
20400 Plummer Street
Chatsworth, CA 91311 USA
Phone: 818-993-4801
Fax: 818-993-9173
Office Hours: Monday-Friday 8:00 A.M. to 5:00 P.M., Pacific Standard Time

European Corporate Headquarters

JMR Electronics United Kingdom
Iain Pickthall
P.O. Box 3058 Wokingham
Berkshire - RG40 3FU - United Kingdom
Phone: + 44-118-973-6018
Fax: + 44-118-973-7191
E-Mail: iain@jmr.com

Internet: <http://www.jmr.com>

Trademarks

JMR, the JMR logo, and **FORTRA**® are registered trademarks of JMR Electronics, Inc. All other product and brand names are the property of their respective holders.

Changes

The material in this document is for information only and is subject to change without notice. JMR Electronics, Inc. reserves the right to make changes to this manual and the equipment described herein without notice. JMR has made all reasonable efforts to ensure that the information in this manual is accurate and complete. However, JMR shall not be liable for any technical or editorial errors or omissions made herein or for incidental, special, or consequential damage of whatsoever nature resulting from the furnishing of this manual, or operation and performance of equipment with this manual.

Disclaimer

The original product packaging has been tested and is safe under normal shipping circumstances. Reshipping the product without using the original product packaging will void the warranty. Do not ship the unit with canisters or power supplies installed as this will void the warranty and could cause damage to the unit and drives. The canisters should be packaged separately within the product packaging as provided.

FCC Information

The **FORTRA**® equipment generates, uses and can radiate radio frequency energy. If the **FORTRA**® Array is not installed and used properly (that is, in strict compliance with these instructions), it may cause interference to radio and television reception.

The **FORTRA**® equipment and its contents are designed to comply with the limits for a Class A computing device in accordance with the specifications in Part 15 of FCC rules. These rules are designed to provide reasonable protection against radio interference in a commercial installation. However, there is no guarantee that interference will not occur in a particular installation. Operation of this equipment in a residential area is likely to cause interference, in which case the user, at his own expense, will be required to take whatever measures are necessary to correct the interference.

WARNING: *Changes or modifications, not expressly approved by the manufacturer, could void the user's authority to use the equipment.*

WARNUNG: *Nicht ausdrücklich durch den Hersteller genehmigte Änderungen oder Modifikationen können die Erlaubnis Zur benutzung der Produkte gefährden.*

You may find the FCC booklet, How to Identify and Resolve Radio Interference Problems, helpful. This booklet is available from the U.S. Government Printing Office, Washington, DC 20402. Stock #004-000-00345-4.

Printed in the USA
Part Number PUB-00180
Revision C, July, 2002 SCS
Patent Pending





Table of Contents

1. Introduction

2/4/6/8/10/12/15-Bay Product Family Features	1-1
10-bay Rackmount Specifications	1-2
10-bay Tower Specifications	1-2
SCSI Features	1-3
Tri Channel	1-3
Automatic Built-In Termination	1-3
ID Selection	1-3
SAF-TE	1-3

2. Hardware Specification

Environmental Specifications	2-2
Electrical Specifications	2-2
Agency Compliance	2-2
Packaging Specifications	2-2
Disclaimer	2-2
Thermal Specifications	2-3
Rotation Vibration Specifications	2-3
Fault Indication Features	2-3
Fault Indicators	2-3
Audible Alert	2-3
SYS-FLT	2-3
S-ACT	2-3

3. Device Installation

SCA Connection and Hot-Swapping	3-1
Canister Removal/Insertion	3-1
Drive Installation	3-2

4. SCSI Setup

Slot Settings	4-1
Available ID's	4-2
ID Conflict	4-2
Option Settings	4-2
Delayed Start Option Jumper	4-2
Remote Start Option Jumper	4-2



Front Status LEDs	4-3
External I/O Connection	4-3
Connections & LEDs	4-3
Host Out	4-3
Host In	4-3
Channel A Out	4-4
Channel B Out	4-4
RS232	4-4
S-ACT	4-4
G5312 SCSI Connections	4-4
G5312 Operating Mode	4-4

5. Blower Operation

Blower Removal/Insertion	5-1
Blower Replacement	5-2

6. Power Supply Operation

Power Supply Removal/Insertion	6-1
Low Power Mode (Standby Power)	6-2
Power Supply Replacement	6-2

7. FR10 Cabinet Installation

Rail Mounting Kit Hardware	7-2
Spare Hardware Parts	7-2
Rail Installation	7-2

8. Installing the G5312

Installation Steps	8-1
ID Settings & Option Jumpers	8-2
Controller Canister Installation	8-2

9. SAF-TE Operation

SAF-TE ID	9-1
Minimum System Requirements	9-1
Software Installation	9-1
DOS Installation	9-2
Windows 95 & 98 Installation	9-2
Software Walkthrough	9-2
Software Controls	9-2





Part 1 Basic Software Overview	9-2
Part 2 FORTRA® SAF-TE Commands	9-5
Command Overview	9-6
Updating Firmware	9-11
EETBL.ASM Default Settings File	9-12
Important Settings	9-13
SAF-TE Commands	9-13
Perform Slot Operation Command	9-14
Read Device Slot Status Command	9-14
Read Enclosure Configuration Command	9-15
Read Enclosure Status Command	9-15
Send Global Command	9-16
Write Device Slot Status Command	9-16
Optional SAF-TE Commands	9-17
*Activate Power Supply Command	9-17
*Read Device Insertions Command	9-17
*Read Usage Statistics Command	9-17
*Set SCSI ID Command	9-17
*Set Fan Speed Command	9-17

10. Product Support

US Corporate Headquarters	10-1
Manual Changes	10-1

Appendix A. Drive and Controller Manufacturers

Drive Manufacturers	A-1
RAID Controller Manufacturers	A-1
Host Bus Adapter Manufacturers	A-2



1. Introduction

The 10-bay **FORTRA**® H1 Chaparral G5312 is designed to be used with a host system to provide a high-end RAID storage solution. The following is a summary of the H1 Chaparral G5312 Tower and Rackmount enclosure features:

- The 10-bay **FORTRA**® H1 Chaparral G5312 Tower enclosure supports up to ten 3.5" HH or LP SCA 80-pin drives. It supports single-ended, and Ultra2 (LVD) SCSI buses. This model has three SCSI channels and built-in auto-switching SE/LVD multi-mode termination on each channel. This SCSI RAID Tower enclosure houses one G5312 RAID controller.
- The 10-bay **FORTRA**® H1 Chaparral G5312 Rackmount is a 19" wide, 3U (5-1/4") high rackmount enclosure that supports up to ten 3.5" HH or LP SCA 80-pin drives. All other features are the same as the 10-bay **FORTRA**® H1 Chaparral G5312 Tower.

2/4/6/8/10/12/15-Bay Product Family Features

FORTRA® and **StorBlade**™ are families of high-end enclosures designed for high-volume performance RAID storage solutions. The following table shows the features of the **FORTRA**® 2/4/6/8/10/12/15-bay and **StorBlade**™ products:

	2-bay	4-bay ^{1,3}	6-bay ^{1,3}	8-bay ¹	10-bay ^{1,2}	12-bay	15-bay ^{1,3}	StorBlade
Number of Device Bays	2	4	6	8	10	12	15	4
Number of Blowers	1	1	1 or 2	2	2	2	2	2
Number of Power Supplies	1	1	1 or 2	2	2	2	2	1 or 2
Number of I/O Channels (SCSI Only)	1	1	2	2	2		2	2
SCSI SE/LVD Supported	✓	✓	✓	✓	✓		✓	✓
Fibre Channel Supported		✓	✓	✓	✓		✓	✓
Hot-Swap Canisters	✓	✓	✓	✓	✓	✓	✓	✓
Removable Power Supplies	✓	✓	✓	✓	✓	✓	✓	Fibre only
Removable Blowers	✓	✓	✓	✓	✓	✓	✓	Fibre Only
N+1 Power Supplies			✓	✓	✓	✓	✓	Fibre only
N+1 Blowers			✓	✓	✓	✓	✓	✓
MIA Support (FC Only)		✓	✓	✓	✓			
Loop Expansion Support (FC Only)		✓	✓	✓	✓		✓	✓
Daisy Chainable (SCSI Only)	✓	✓	✓	✓	✓			✓
Built-in Termination (SCSI Only)			✓	✓	✓		✓	
Auto Termination (SCSI Only)			✓	✓	✓		✓	
SAF-TE/SES Ready (Optional)			✓	✓	✓		✓	Fibre only
SAF-TE/SES Compatible			✓	✓	✓		✓	Fibre only
SCSI to SCSI RAID Support				✓	✓		✓	✓
Fibre to SCSI RAID Support					✓		✓	
Fibre to Fibre RAID Support					✓		✓	✓
Fibre to ATA RAID Support						✓		
SCSI to ATA RAID Support						✓		
(D)esktop/(T)ower/(R)ackmount	D	D	DTR	T	TR	R	TR	R

* 6/10/15-bay unit features apply to both Tower and Rackmount models
¹ Features are based on a standard configuration with no internal host controller(s) installed
² Fibre channel 10/15-bay enclosures have built-in SES
³ Fibre Channel 2Gb Model available. 2Gb models use SFP transceivers.





FORTRA® products use advanced mid-plane technology developed by JMR, which allows power supplies, drives, and all other enclosure components to interface into a single board. This provides superior performance and easy connectivity.

The host interface supports one SCSI-2 host connection and two SCSI-2 disk connections. The SCSI-2 connections are made using a High-Density 68-pin SCSI cable.

NOTE: FORTRA® 10-bay SCSI RAID enclosures do not support high-voltage differential (HVD) SCSI

10-bay Rackmount Specifications

Dimensions/Weight

Unit Weight	40 lbs. (18.2kg)
Height	5-1/4" (3U) (133mm)
Width	19" (483mm)
Depth	23" (584mm)

Power Supply (Each power supply includes internal cooling fan)

Quantity:	2
Power:	430 Watts each (N+1) Power Factor Correction
Input:	100-260 VAC; 50-60Hz
Output:	+5V @ 35A +12V @ 30A

Blower

Quantity:	2
Size:	97mm (3.82") each
Air Flow:	25.42CFM (0.72m ³ /min)
Noise:	52dB(A)

10-bay Tower Specifications

Dimensions/Weight

Unit Weight	43 lbs. (19.5kg)
Height	20-1/2" (521mm)
Width	9-5/8" (235mm)
Depth	24" (610mm)





Power Supply (Each power supply includes internal cooling fan)

Quantity: 2
Power: 430 Watts each (N+1) Power Factor Correction
Input: 100-260 VAC; 50-60Hz
Output: +5V @ 35A
 +12V @ 30A

Blower

Quantity: 2
Size: 97mm (3.82") each
Air Flow: 25.42CFM (0.72m3/min) each
Noise: 52dB(A)

SCSI Features

Tri Channel

The 10-bay SCSI RAID with G5312 both Tower and Rackmount enclosures have a tri SCSI bus configuration with five drive bays on internal bus A and five drive bays on internal bus B. In addition, there are two external connections for SCSI host bus connection IN and OUT.

Automatic Built-In Termination

The unit provides automatic dual-mode SE/LVD termination enable and disable for any Single-Ended or LVD SCSI devices installed in the unit.

ID Selection

Standard default ID's are pre-configured as follows:

Channel A: ID 0, 1, 2, 3, 4
Channel B: ID 0, 1, 2, 3, 4
SAF-TE: Channel A, ID 5 (Optional)

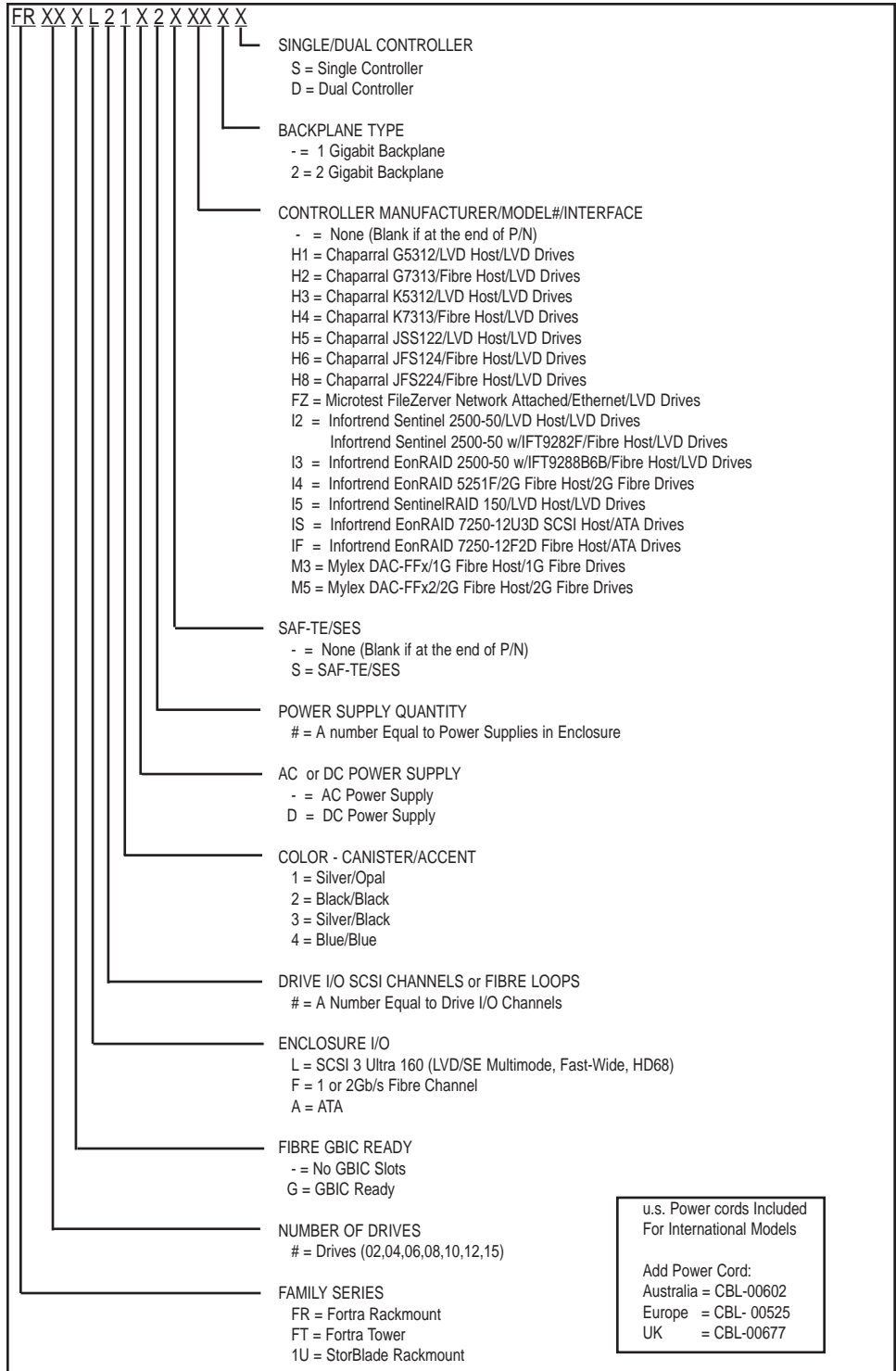
SAF-TE

The SAF-TE command set is supported by the SAF-TE board installed in the unit. Host setup software is included and is supported under Dos 5.0+, Windows 95, and Windows 98. Boot disk must load DOS SCSI drivers from autoexec.bat and config.sys. Host bus adapter ASPI drivers are required to run the test software. The software is not needed for SAF-TE to operate. The processor will operate normally without user intervention as long as the host bus adapter or RAID controller supports the SAF-TE protocol.



2. Hardware Specification

This chapter covers specification information for all **FORTRA**® enclosures. The following matrix describes the available configurations for **FORTRA**® and **StorBlade**™ enclosures.





Environmental Specifications

Operating Temperature: 5°C to 40°C (41°F to 104°F)

Storage Temperature: 0°C to 65°C (32°F to 149°F)

The maximum recommended ambient temperature depends on the recommendation of the manufacturer for the devices being installed.

Electrical Specifications

AC Inlet Type: IEC320/EN60320

Power Cord: NEMA5-15P

Power Supply: Auto-switching for 110/220V operation

Agency Compliance

FORTRA® enclosures have been designed and built to comply with the FCC Class A, UL, CSA/TUV, CE, and C-Tick standards. For more information on FCC Class A compliances, see page 2.

Packaging Specifications

FORTRA® packaging has been designed to be reusable and recyclable. Drives may be installed and shipped in the canisters as long as the canisters are not installed in the enclosure. Shipping the unit with canisters and/or power supplies installed in the enclosure may cause damage to the enclosure or to the drives and will void the warranty.

SAFETY TIP: Reshipping the enclosure with canisters, drives, or power supplies installed in the enclosure may cause damage to these components and will void the warranty

SICHERHEITSHINWEIS: Der Versand des Gehäuses mit eingebauten Einschüben, Platten und Netzteilen kann zur Beschädigung dieser Komponenten führen und somit den Garantieanspruch gefährden.

Packaging complies with ISTA (International Safe Transit Association) standards and has been ISTA certified.

Each canister is pre-packaged in an anti-static bag. Do not throw the packaging away if the product is intended for re-shipping. When transporting or shipping a JMR approved shipping container must be used.

Disclaimer

The original product packaging has been tested and is safe under normal shipping circumstances. Reshipping the product without using the original product packaging will void the warranty. Do not ship the unit with canisters and/or power supplies installed in the enclosure as this will void the warranty and could cause damage to the unit and drives. The canisters should be packaged separately within the product packaging, as provided.





Thermal Specifications

FORTRA® enclosures have been designed to meet the air-flow/cooling requirements for popular 7,200, 10,000, and 15,000 RPM disk drives. Using high performance blowers, air is pulled in from all open vents and exhausted out the back of the unit.

On 10-bay units, the blower speed can be manually changed through the SAF-TE interface for noise control.

Rotation Vibration Specifications

FORTRA® enclosures have been designed to meet the rotation vibration/shock requirements for popular 7,200, 10,000, and 15,000 RPM disk drives.

Fault Indication Features

This section reviews the indicators that will notify the user of a power supply or blower that is in a fault state. More information is available in [Chapter 5](#) (blowers) and [Chapter 6](#) (power supply).

Fault Indicators

On a blower fault, all the front status LEDs will blink 'Red'. The blower LED on the back of the unit will light red and an audible alert will sound three times.

On a power supply fault, all the front status LEDs will also blink 'Red'. The power supply fault LED will light and an audible alert will sound five times.

On a temperature fault, the audible alert will sound two times.

Audible Alert

There are three audible enclosure alerts:

- Two beeps indicate a temperature issue.
- Three beeps indicate a blower failure;
- Five beeps indicate a power supply failure;

SYS-FLT

The SYS-FLT LED on the back of the unit indicates an error on the SAF-TE bus. It will also blink whenever the host controller interrogates the SAF-TE processor for a status update.

S-ACT

The S-ACT LED will blink to indicate activity on the SAF-TE bus.



3. Device Installation

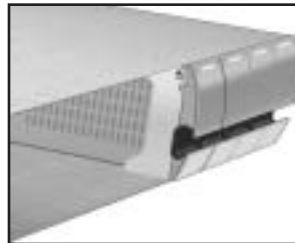
This chapter covers SCSI device installation for 10-bay rackmount and 10-bay tower enclosures.

SCA Connection and Hot-Swapping

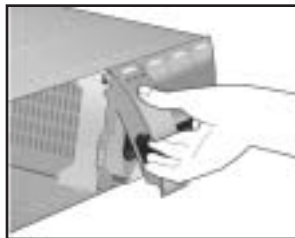
The unit uses SCA-2 (80-pin) connectors which provide a safe means of connection/disconnection when hot-swapping devices. In order to hot-swap devices, the host adapter or RAID controller and host operating software must support the feature. Any SCA (80-pin) drive is capable of plugging directly into the backplane of the unit and should not require any additional cabling or connections.

Canister Removal/Insertion

1. The photo to the right shows the canister in a locked position.



2. Pull the handle out to unlock the canister from the **FORTRA**® unit. Ensure that the thumb is placed below the line. Pressing the thumb against the Status LED lens could break it. Notice that the locking tab slides down as the handle is pulled out.



SAFETY TIP: After disengaging a device from the enclosure, allow 10 seconds before pulling the canister out of the unit. This allows the device to properly spin/shut down before transport.

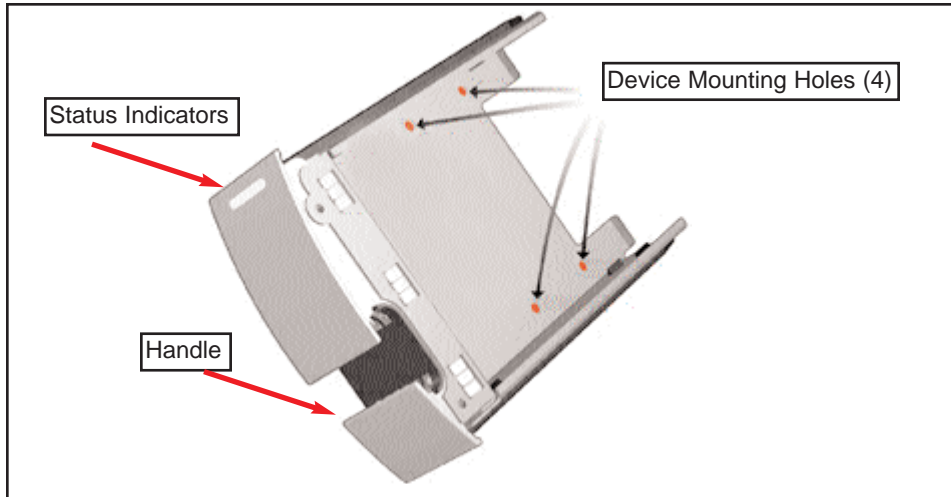
SICHERHEITSHINWEIS: Nachdem ein Einschub vom Gehäuse wie in "Step 3" gezeigt gelöst wurde, warten Sie bitte ca. 10 Sekunden bevor der Einschub ganz heraus gezogen wird. Dies ermöglicht den Auslauf der Festplatte bis zum vollständigen Stillstand der rotierenden Scheiben für einen sicheren Transport.

3. Pull the canister straight out to remove. Ensure that any installed devices are spun down before full removal to prevent damage to the drive.



Follow the steps in reverse to reinstall.

Drive Installation



Device mounting screws are included with the unit for device mounting. The JMR part number for the #6-32" mounting screws is HDS-01906.

WARNING: Before device installation, alleviate any electro-static discharge by touching a grounded metal assembly. Static can be potentially damaging to enclosure components.

WARNUNG: Berühren Sie vor der Festplatteninstallation geerdete Metallgegenstände, um elektro statische Aufladung abzuleiten. Statische Aufladung kann elektronische Gehäusekomponenten schwer beschädigen.

WARNING: The #6-32 mounting screws that are provided have been specially designed to fit the canisters. Do not install the device using screws other than the ones provided.

WARNUNG: Die mitgelieferten Befestigungsschrauben #6-32 wurden speziell für die Einschübe angefertigt und zur Befestigung der Festplatte sollten Sie keinesfalls andere als diese verwenden.

1. After removing the canister, place it on a static free surface along with the device to be installed.
2. Place the device in the canister and mount it using the provided screws (use 4 screws to mount the drive).
3. Replace the canister into the unit by following the steps for Removal of a Device Canister but in reverse order.



4. Repeat steps 1 through 3 until all devices are installed, then move onto step 5 to complete unit setup and installation.
5. For 10-bay rackmount units, refer to [Chapter 7](#) to install the enclosure into a cabinet.
6. Establish host connection. See [Chapter 4](#) for SCSI host connection.



4. SCSI Setup

This chapter covers SCSI device setup and option settings. Please take note of the installation warnings below before beginning setup.

WARNING: Take care when connecting the unit to an AC power source to ensure that it is plugged-in to a circuit of the appropriate rating (110v or 220v). For safe operation, the circuit should have over-current protection to prevent damage to the unit in the event of circuit overloading.

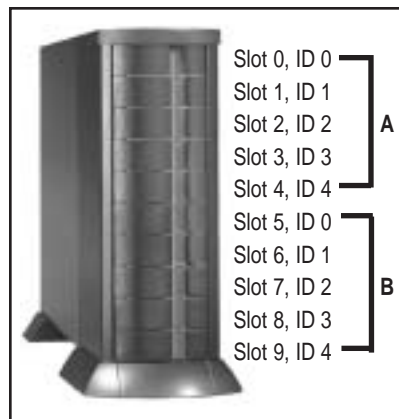
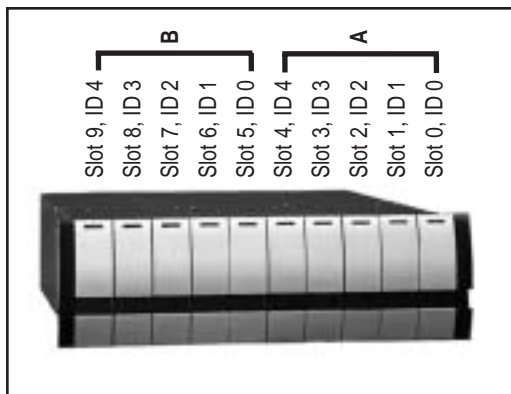
WARNUNG: Vergewissern Sie sich, daß die Netzspannung (220V / 110V) korrekt eingestellt ist, bevor Sie das Gerät mit dem Stromnetz verbinden. Zur Sicherheit sollte das Netz über einen Überspannungsschutz zur Vermeidung von Schäden im Falle einer Überlast verfügen.

WARNING: When connecting the unit to an AC outlet or power strip, ensure that the outlet has the proper connection for grounding. The AC power cables included with the unit have three prongs, one of which is used for the ground connection. Do not use a two prong AC cable with the unit since this will not allow for proper unit grounding and could cause problems with normal unit operation.

WARNUNG: Bei der Verbindung der Unit mit einer Steckdose oder einer Verteilerdose sollten sie auf eine korrekte Erdung derselben achten. Die mitgelieferten Kaltgeräteanschlußkabel habe 3 Kontakte, von denen einer zur Erdung verwendet wird. Verwenden Sie kein Stromkabel mit 2 Anschlüssen, da dieses keine korrekte Erdung ermöglicht und Probleme während des regulären Betriebs verursachen kann.

Slot Settings

The pictures below show the slot numbering sequence and the default ID settings. Channel A and B default ID settings are factory set and can only be changed by using the SAF-TE Test Utility. Refer to [Chapter 9](#) for SAF-TE utility setup and use.



Available ID's

Each bus is allowed to have ID's that range from 0-15. No two devices on the same bus may share the same ID. Each host controller always uses one ID. The on-board SAF-TE processor uses one ID which defaults to ID 5 of bus A.

ID Conflict

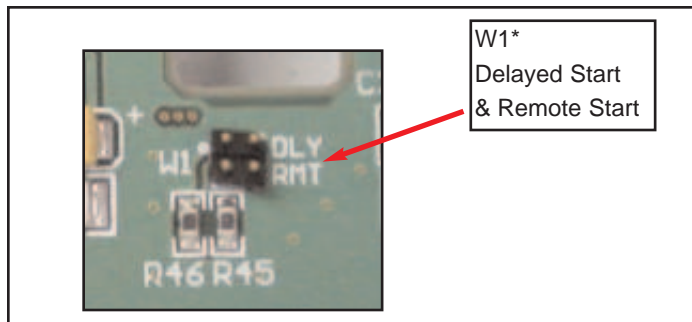
When two devices share the same SCSI ID, a conflict occurs. This conflict must be corrected before the SCSI bus will work properly. If a conflict occurs, check that no two devices on the bus share the same ID.

Option Settings

Two option settings are located on the personality card. To access the jumpers, the cover and all controller module canisters must be removed. The diagram below shows the location of the option settings on the personality card.

WARNING: Before opening the cover, disconnect the AC power cord from both AC inlets to prevent injury.

WARNUNG: Vor dem Entfernen der Abdeckung sind beide 220V Netzkabel (Kaltgeräteanschlußkabel) zu entfernen, um Verletzungen zu vermeiden.



Delayed Start Option Jumper

Header W1 pins 1 & 2. (top two pins)

Jumper on = enabled.

Jumper off = disabled (default).

Remote Start Option Jumper

Header W1 pins 3 & 4. (bottom two pins)

Jumper on = enabled.

Jumper off = disabled (default).

Front Status LEDs

A status indicator is located on each canister. A 'Blue' light indicates normal drive activity. A 'Red' light indicates a device fault. If all canisters display a 'Red' light that is blinking on and off it indicates that there is a system fault. A system fault is either a power supply or blower failure. Check the back of the unit to determine which fault has occurred. Refer to [Chapter 5](#) for blower fault indicator location and to [Chapter 6](#) for power supply fault indicator location.

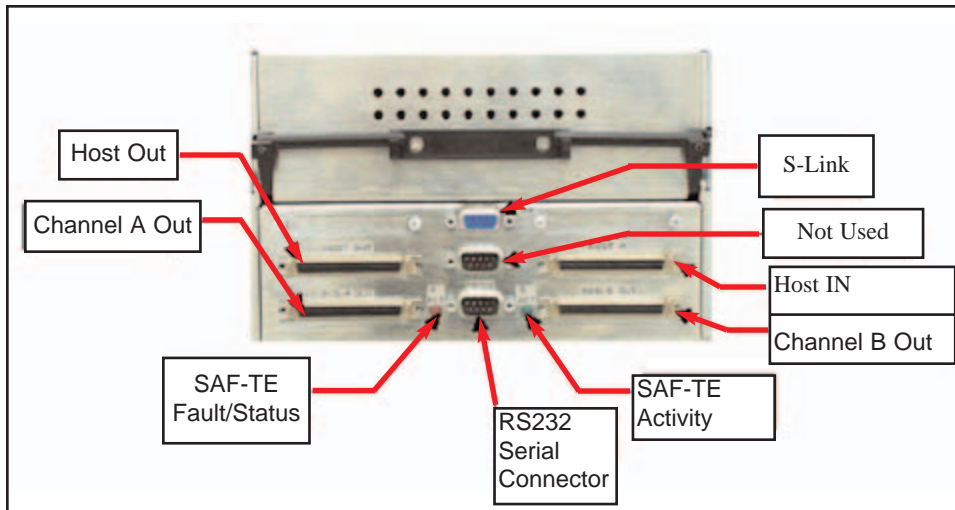


External I/O Connection

The external I/O connections are located on the back of the unit. The figure below shows the external I/O connections available. The left rear side of the unit is a mirror of the right side.

The figure below shows the rear I/O connections for the unit along with status LEDs.

Connections & LEDs



Host Out
SCSI host connection out.

Host In
SCSI host connection in.

Channel A Out

HD-68 female connector. Drive connection for daisy-chaining Chan A to other external enclosures.

Channel B Out

HD-68 female connector. Drive connection for daisy-chaining Chan B to other external enclosures.

RS232

DB-9, RS-232 Serial Connection for G5312 controller. Use straight through cable only.

S-ACT

SAF-TE Activity LED. This LED will blink when there is SAF-TE bus activity between a controller and the JMR SAF-TE processor.

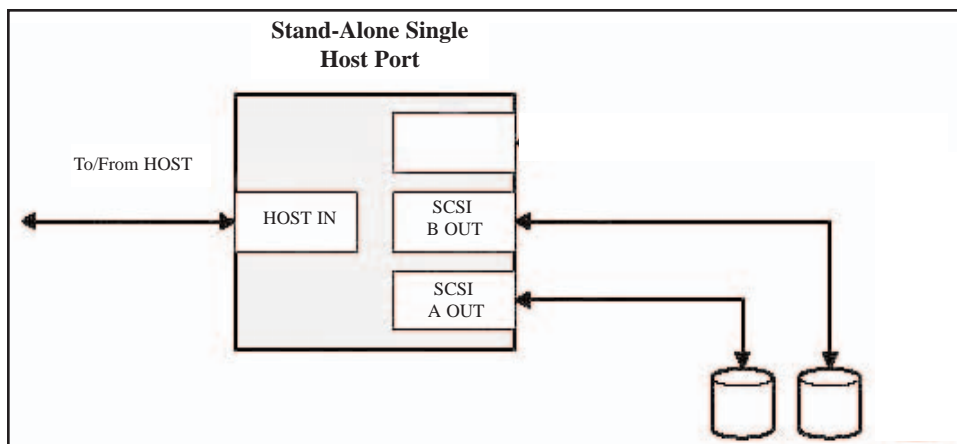
G5312 SCSI Connections

There are four SCSI-2 (LVD) connections on the rear of the 10-bay enclosure. These connections are used to connect the G5312 controller to SCSI external enclosures (**Channel A Out** and **Channel B Out**). The remaining two SCSI connections are used to connect to host systems (**Host In** and **Host Out**).

G5312 Operating Mode

The only operating mode for the G5312 is the following:

Stand-Alone (Single Controller) Single Host Port - Use this mode with a single controller when only a single host interface. Channel A and Channel B are connected internally to five drive bays each and have an external connection to daisy-chain to other enclosures (**Chan A OUT** and **Chan B OUT**). The **Host In** and **Host Out** connections are used to connect to a host system.



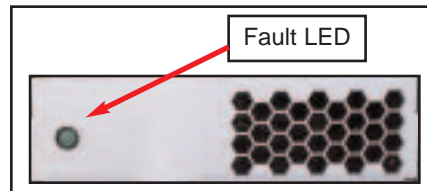
5. Blower Operation

This chapter covers all operations of the blowers for 10-bay units. Refer to Chapter 1 for blower specifications. The blowers are hot swappable and can be removed or installed while the enclosure continues to function, however, failure to replace a non-working blower within a reasonable period of time may expose drives to extreme heat, which could cause loss of data.

WARNING: *Blowers are a system critical component. Non-operating blowers should be replaced as soon as possible to avoid data loss or device failure.*

WARNUNG: *Gebläse sind für die Funktion wichtige Komponenten. Nicht funktionierende Gebläse sollten so schnell wie möglich ersetzt werden, um Datenverluste oder Fehlfunktionen zu vermeiden.*

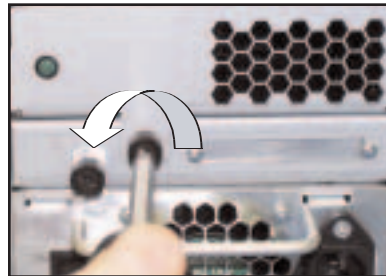
The blowers are located on the back of the unit and each has its own fault LED that will light if the blower is non-operational.



Blower Removal/Insertion

The blower is designed to be easily installed and removed.

1. Unfasten the blower thumbscrew by turning counterclockwise. A Phillips head screwdriver can be used if the thumbscrew is too tight to turn by hand.
2. Remove the blower sled by pulling out on the handle and grasping the side of the blower tray. Wait for the blower to stop completely before removing it from the unit.



Reverse the steps to reinstall the blower.

WARNING: *To prevent injury when removing or installing the blower, do not grab the bottom of the tray which is used for blower access intake. The blower operates at high speeds and continues to spin for a short time after power is disconnected.*

WARNUNG: *Um Verletzungen während der Entfernung oder Installation des Gebläses zu vermeiden, berühren Sie nicht dessen Unterseite, da hier der Lufteintritt erfolgt. Das Gebläse arbeitet mit hohen Geschwindigkeiten und läuft nach Abschalten der Versorgungsspannung noch einige Zeit nach.*

WARNING: Avoid direct contact with the blower intake access hole while the blower is running. The blower operates at high speeds and can cause injury.

User's removing or installing a blower must be aware of the blower access hole. Contact with the access hole must be avoided while the blower is running to prevent injury.



Blower Replacement

If the blower has stopped running or the fault LED indicator is lit, the blower may need to be replaced. Before replacing, the connection should be checked to ensure that the connector is firmly seated and that there is nothing blocking the blower blades that could cause interference.

If a blower is believed to be in a nonfunctional state, please contact the place of purchase for repair or replacement.

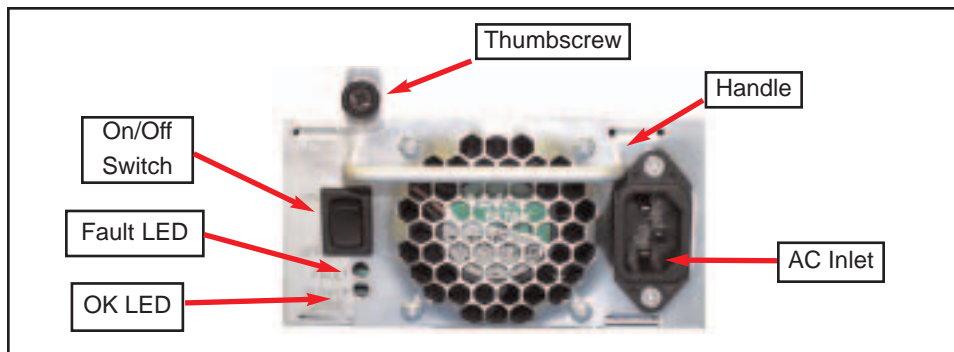
The JMR part number for a replacement blower is shown below. The assembly includes the tray along with the blower.

Model	JMR Part Number
10-bay	SBA-04858

6. Power Supply Operation

This chapter covers all operations of the power supplies. For operation, the AC cord (included) must be connected to the AC Inlet on each supply, and the power supply must be switched ON. The 'OK LED' will light to indicate the power supply is functioning properly. If the power supply experiences a problem and cannot operate within its normal specifications, the Fault LED will light and the power supply will shut itself off.

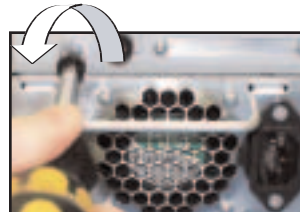
The power supplies also have their own fan included to maintain proper cooling within each supply and also provide some additional, but minimal airflow through the rest of the enclosure.



Power Supply Removal/Insertion

Follow the following steps to either remove a power supply in a 10/15-bay unit.

1. Unfasten the power supply thumbscrew by turning counterclockwise. A Phillips head screwdriver may be used if the thumbscrew is too tight to turn by hand.



2. Remove by pulling out on the handle.



Reverse the steps to reinstall the power supply.

Low Power Mode (Standby Power)

When both power supplies are turned off, the unit will switch to low power or standby mode and the power supply fans will continue to run. The unit blowers will remain operational if a single power supply is turned off, not installed, or fails, in order to maintain the proper low temperature within the unit. To stop the power supply fans and turn the unit off completely, it must be disconnected from the AC power source.

Power Supply Replacement

If the Power Supply Fault LED indicator is lit, the power supply may need to be replaced. Before replacing, the power supply should be turned off, removed from the enclosure, and reinstalled. The AC cable connection should be checked to ensure that the connector is firmly seated and the power supply should be firmly inserted with the thumbscrew tightly securing it. If the Fault LED indicator is still coming on, then the power supply should be replaced.

If the fan in the power supply is not functioning but the power supply still works, the power supply unit should be replaced as soon as possible. Leaving the power supply running without the fan could cause the power supply to overheat and shutdown at any time.

If you believe a power supply is in a nonfunctional state, please contact the place of purchase for repair or replacement.

JMR part number for a replacement power supply is shown below. The assembly includes the power supply installed in the canister.

Model	JMR Part Number
10-bay	PSS-00721

SAFETY TIP: Both power supplies should be installed into the unit at all times to maintain proper cooling and airflow within the enclosure. In the event of a power supply failure, the faulty supply should be left in the enclosure until a replacement power supply is available.



7. FR10 Cabinet Installation

This chapter covers the installation of the Rackmount enclosure into a standard 19" (483mm) wide and 30" (762mm) to 36" (914mm) deep cabinet that meets the EMA/RETMA standards.

Before beginning rail installation, please take note of the following precautions:

NOTE: *When installing the unit into a cabinet or closed environment, the operating ambient temperature of the rack environment may be greater than the maximum recommended ambient temperature. Consideration must be taken to meet the maximum recommended ambient temperature (T_{mra}) for the best unit operation.*

HINWEIS: *Wenn das Gerät in einen Gehäuseschrank oder eine sonstige geschlossene Umgebung verbaut wird, kann die Umgebungstemperatur über die maximal zulässige Betriebstemperatur ansteigen. Maßnahmen bzgl. der maximalen, empfohlenen Betriebstemperatur (T_{mra}) müssen getroffen werden, um eine bestmögliche Funktion des Gerätes zu gewährleisten.*

WARNING: *Ensure that the front and back of the unit are not blocked when installing the unit into a cabinet or closed area. Blocking the front or back of the unit can cause reduced air-flow that will compromise the safe operating environment within the unit.*

WARNUNG: *Vergewissern Sie sich, daß das Gerät an Vorder- und Rückseite nicht abgedeckt ist, wenn das Gerät in einem Gehäuseschrank oder einer geschlossenen Umgebung verbaut wird. Abdeckung der Vorder- und Rückseite kann verminderte Kühlung zur Folge haben und somit sichere Betriebsbedingungen negativ beeinflussen.*

WARNING: *When loading the unit into a cabinet, ensure that a hazardous condition is not achieved due to uneven mechanical loading. To prevent injury, remove the power supplies and drives before loading, and re-install them after the unit has been secured in the cabinet.*

WARNUNG: *Vermeiden Sie während des Einbaus des Gerätes in einen Gehäuseschrank jegliche gefährliche Aktionen, selbst wenn diese nur mechanischer Art sind. Um Verletzungen zu vermeiden, entfernen Sie die Netzteile und Laufwerke vor der Montage und installieren Sie diese erst erneut, wenn das Gerät im Gehäuseschrank gesichert ist. Vergewissern Sie sich, daß das Gerät an Vorder- und Rückseite nicht abgedeckt ist.*



Rail Mounting Kit Hardware

- Ten #10-32 Screws
- Four each #8-32 Screws/Washers/Nuts



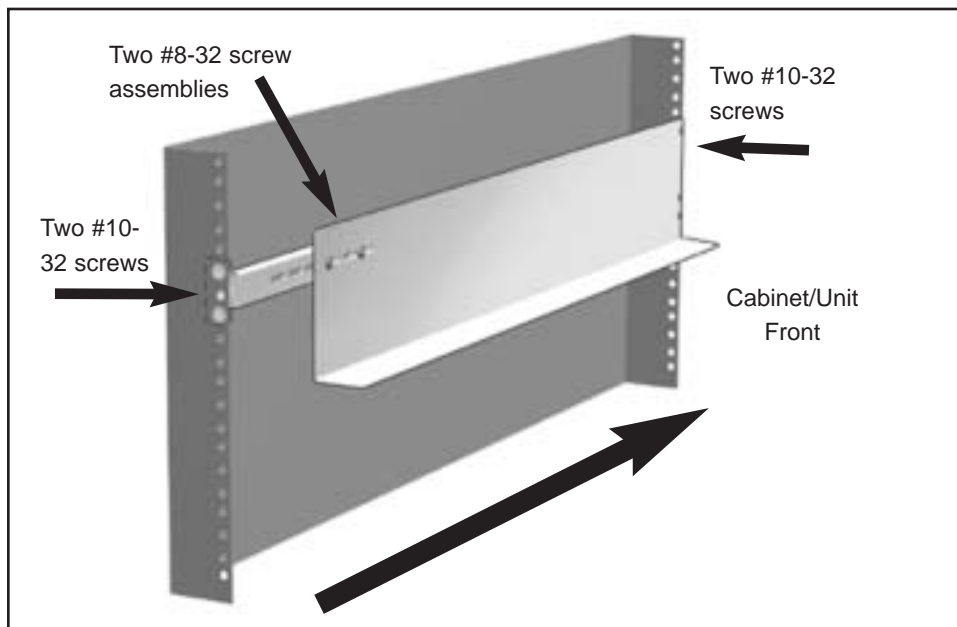
Spare Hardware Parts

Check with a JMR Sales Representative for pricing and availability of spare hardware parts.

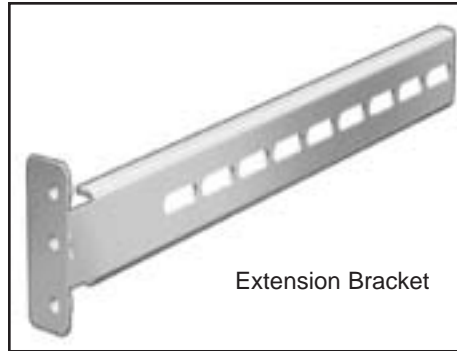
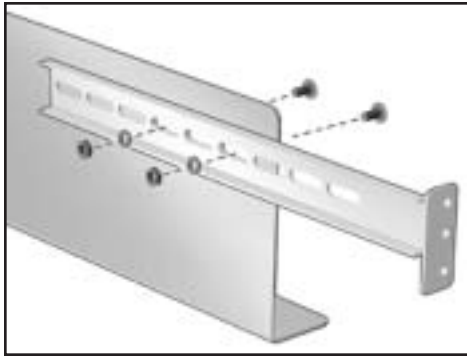
Description	JMR Part Number
#10-32 Screw	HDS-01580
#8-32 Screw	HDS-00350
#8-32 Nut	HDN-00040
#8-32 Washer	HDW-00080

Rail Installation

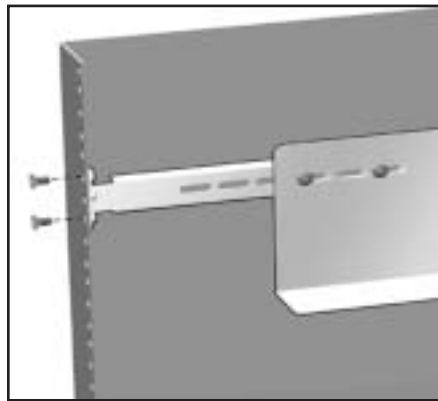
A completed rail assembly without the unit installed would look like this:



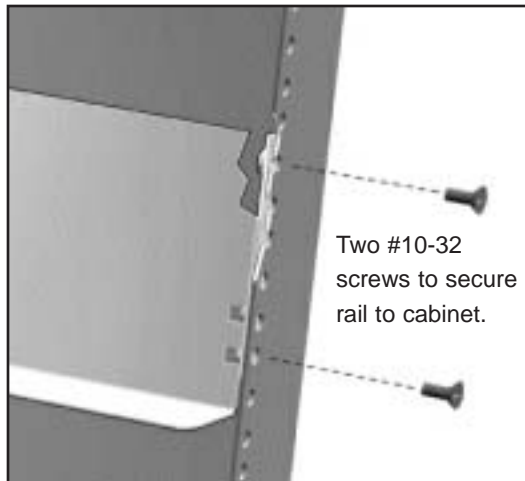
1. Affix the extension brackets to the main rail using the #8-32 screw/washer/nut assemblies. Adjust to the correct length for the cabinet depth being used.



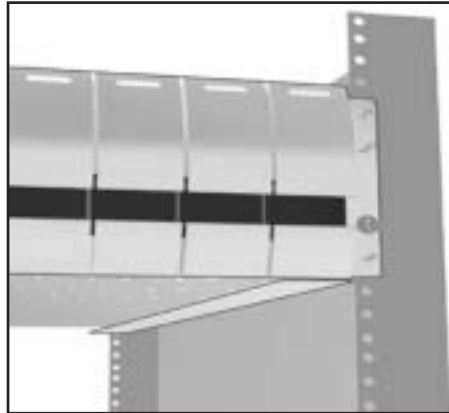
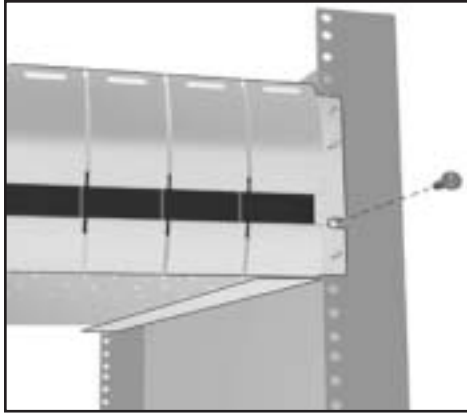
2. Affix the extension bracket to the rear of the unit using two #10-32 screws. There are 3 holes in the extension bracket for mounting. Depending on the hole pattern that is being used in the cabinet, two holes should always be available for securing the extension bracket.



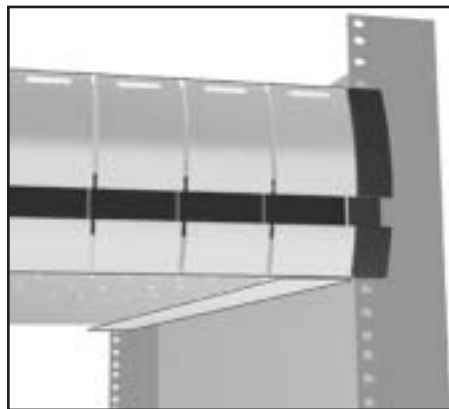
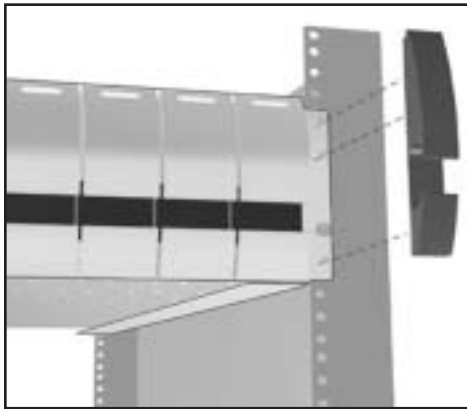
3. The fronts of the rails have three holes. Two of the holes (top and bottom) are used to secure the rail to the cabinet. The middle hole is used to secure the enclosure to the rail and cabinet. Secure the front of each rail to the cabinet vertical rails using two #10-32 screws for each rail.



- Slide the unit into the cabinet and secure it to the cabinet with a single #10-32 screw on each side.



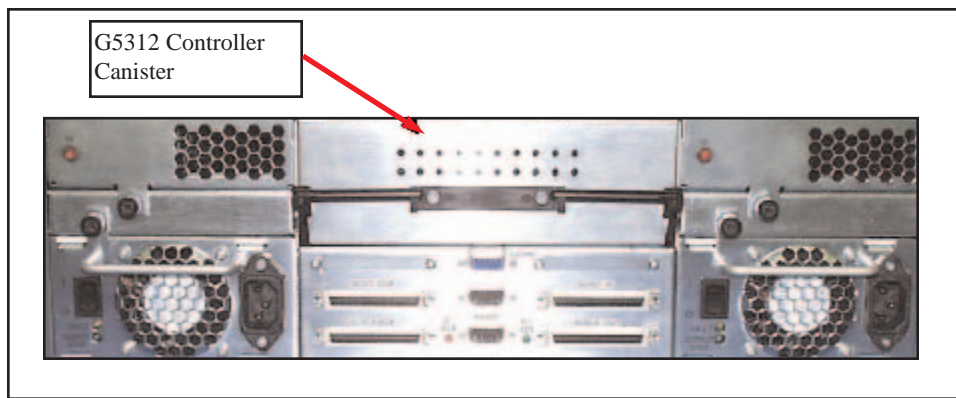
- Snap the end cap over the screw on each side of the unit to finish the installation.



8. Installing the G5312

The **FORTRA**® H1 Chaparral G5312 is designed to be used with one G5312 SCSI to SCSI RAID bridge controller from Chaparral. The unit provides one SCSI LVD SCSI-2 host connection and two SCSI LVD SCSI-2 (80MB/s) device channels which are backwards compatible with SE SCSI.

The figure below shows the rear unit view where all of the I/O and power connections are made. Additionally, each controller can be removed from the back of the unit and the power supplies and blowers may be hot-swapped from the rear of the unit.



Installation Steps

1. If the G5312 controller is not installed in canisters, then install the controller into the JMR canister provided and plug into the unit. See Section, '**Controller Canister Installation**'.
2. Install up to 10, 3.5" LP SCSI hard disk drives into the device canisters using 4 screws per device (Screws have been provided - JMR P/N HDS-01906) for mounting, and install into the front of the unit. Refer to [Chapter 3](#) for drive installation.
3. Configure additional option settings as required. Refer to [Chapter 4](#) for option settings.
4. Plug in the two AC power cords to the AC inlet located on each power supply in the rear of the unit. Turn both power supplies on using the on/off switch located on each power supply.
5. Use a straight through DB-9 serial cable to communicate to the controller(s) for RAID array creation and setup. Refer to Chaparral documentation for correct serial port settings.
6. After the RAID set has been created, connect the Fibre channel host I/O port(s) to a HBA and configure the RAID array in the O/S environment.



ID Settings & Option Jumpers

Refer to [Chapter 4](#) and [Chapter 9](#) for SCSI ID settings and option jumper settings.

Controller Canister Installation

1. Remove the four cover screws on the controller canister using a Phillips head screwdriver and lift the cover off the canister.
2. Mount the controller into the canister with four screws that are provided inside of the canister.
3. Connect the backup battery to the controller.
4. Connect the cover fan to the controller and close the canister cover. Replace the 6 screws from Step 1 to secure the cover.
5. Install the controller canister into the Fortra unit.



9. SAF-TE Operation

For bus management, the **FORTRA**® 10-bay SCSI RAID enclosures have a SAF-TE (SCSI Accessed Fault-Tolerant Enclosure) processor designed to the ANSI approval version 2.0 of the SAF-TE specification. Test utility software is provided for setup and diagnostics of the SAF-TE processor. The SAF-TE processor can monitor and manage all devices including itself. There does not need to be any devices installed in the unit to communicate with the SAF-TE processor.

SAF-TE ID

The SAF-TE board has a SCSI ID that defaults to SCSI ID 5. This default ID can be changed using the JMR SAF-TE Setup utility software. Ensure that no other devices on the channel conflict with the SAF-TE SCSI ID. The SCSI ID settings made using the SAF-TE processor will always override any hard ID jumper settings on the unit.

NOTE: The SAF-TE chip ID will only operate at SCSI ID's 0-7. **DO NOT** set the SAF-TE ID outside this range as it will render the SAF-TE chip inoperable.

Minimum System Requirements

FORTRA® unit with SAF-TE

386 processor or better

3.5" floppy drive (1.44 MB)

4 MB RAM

1.5MB free hard disk space

SAF-TE compatible host adapter

ASPI manager installed

MS-DOS 5.0 or higher, Windows 95 & 98 DOS mode supported (Windows NT & 2000, UNIX are NOT supported).

The utility software is for set-up and diagnostics only. It can be used to access SAF-TE commands for setup purposes even when a SAF-TE compatible host adapter is not installed.

Software Installation

Before installing the software, ensure that the minimum system requirements have been met. A SCSI host adapter must be installed and connected to the unit. The host system must be running a compatible operating system and have a host controller compatible ASPI manager installed. The SCSI host adapter must recognize the SAF-TE processor on the bus in order for the software to communicate with the enclosure.



DOS Installation

1. Insert the JMR Utility disk into the floppy drive.
2. Change to the floppy drive that the JMR Utility disk is in.
Example: At the DOS command prompt, type **A:** and press **ENTER**.
3. At the disk command prompt (**A:\>**), type **CD DOS** and press **ENTER**.
4. Type **INSTALL**, and press **ENTER**.
5. This will install the files to the directory **C:\JMR** by default.
6. The program will switch to the **C:\JMR** directory.
7. At the **C:\JMR>** prompt, type **JMRSAFT** and press **ENTER** to execute the software.
8. See the *Software Walkthrough* section for information on using the program.
9. To uninstall the software, type **UNINSTAL** and press **ENTER** from the **C:\JMR** directory.

Windows 95 & 98 Installation

1. From the Windows taskbar, click **START**, and then click **RUN**.
2. In **Open**, type **A:\WIN\SETUP.EXE** and then click **OK**.
3. The installation program will guide you through the rest of the setup process.
Icons will be created to run the program. Click on the **JMR SAF-TE/SES** Icon to run the program.
4. See the *Software Walkthrough* section for information on using the program.
5. To uninstall the software, run the uninstall program located in the JMR folder created during installation.

Software Walkthrough

This section covers the operation of the JMR SAF-TE utility software that is included with a SAF-TE enabled **FORTRA**[®]. **Part 1** details the basic software overview. **Part 2** details the software commands available to a **FORTRA**[®] unit with SAF-TE.

Software Controls

Use the arrow keys to navigate within the software and use the ESC key to back up to the previous menu. To select a menu item press ENTER. A two-button mouse can also be used to navigate through the menu's. The LEFT mouse button is the same as pressing ENTER and the RIGHT mouse button is the same as pressing ESC.

Part 1 Basic Software Overview

After loading the software as directed in the **Software Installation** section, the main screen will appear. The top of the screen shows the title bar and version of the software. Select the **Select Host Adapter** command.



The following Figure shows the host adapter selection screen.

From this screen the host adapter to be communicated with can be chosen. The example shows that there are two host adapters installed in the system.



This next screen shows how the target device may be selected. Different options are available depending on the device selected. If a SAF-TE device is selected, the next menu will display any available SAF-TE commands. If a disk drive, CD-ROM, or other media device is selected, the next menu will display any available commands that are pertinent to that device.



This next screen shows the Main Device Screen and lists the commands available. The **Main Device Screen** lists the commands available to a CD-ROM drive, hard disk drive, or other SCSI peripheral selected. The commands are: Test Unit Ready, Inquiry, Read Capacity, and Spin up/down Unit. These commands are described in more detail in the next five screens. The bottom of the screen shows the host adapter and target that have been selected.



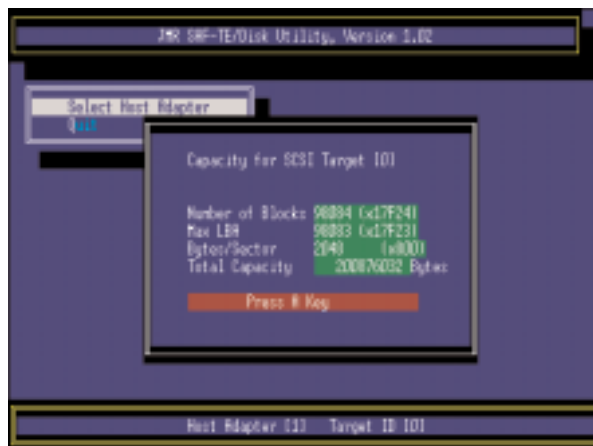
This next screen shows the **Test Unit Ready Screen**. If the unit is online and ready, the dialog box will report **Target [x] Ready**. If the unit is offline, the dialog box will report **Target [x] Not Ready**. 'x' is the number of the target that was selected previously and any commands that are initiated will only affect that target. To select a different device, use the ESC key to back up a menu and select it.



This next screen shows the **Inquiry Screen** that is used to report information on the device as read from the device itself. Since this information is from the device, the information will vary. The **Product ID** typically shows a model number of the device and the **Product Revision Level** will typically show the firmware revision the device is currently using. The other information on this screen applies only under circumstances when troubleshooting is necessary.



This screen shows the **Read Capacity Screen** which reports the capacity settings and configuration of the target device.



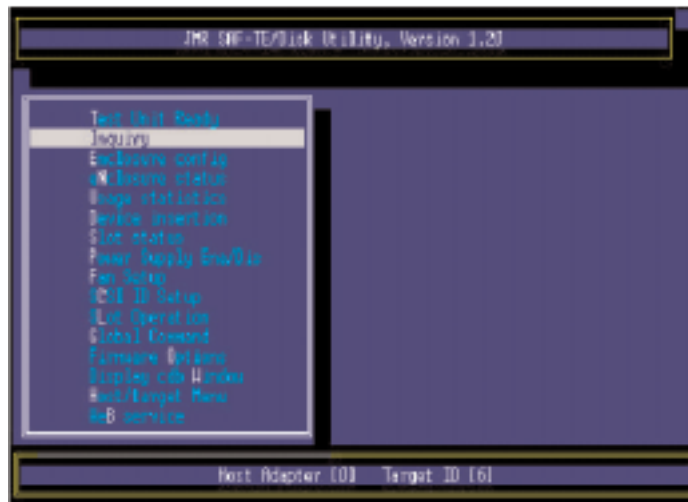
This screen shows the **Spin up/down Unit Screen**. These commands are only effective when using hard disk drives. The **Spin up Unit** command will power on the target device. The **Spin down Unit** command will power off the target device. Just as a precaution, it is safer to spin a device down before removing it to prevent damage.



Part 2 FORTRA® SAF-TE Commands

This screen shows the command menu available if a **FORTRA®** SAF-TE device ID is selected at the **SCSI Device Selection Screen**.

There are several commands available in the menu screen shown and they are briefly described in the 'Command Overview' section.





Command Overview

Test Unit Ready	Reports if communication is established between a host adapter and the SAF-TE processor.
Inquiry	Reads device firmware and identifies device part number, firmware revision and other information.
Enclosure Config	Displays the enclosure configuration.
Enclosure Status	Indicates temperature, SCSI ID settings, blower and power supply status.
Usage Statistics	Reports on/off cycles and total number of power on hours.
Device Insertion	Reports how many times a device has been inserted in each slot.
Slot Status	Reports the status of the device in each slot.
Power Supply Ena/Dis	Enables or disables selected power supply.
Fan Setup	Manual fan/blower control allows for slowing down, speeding up, or turning off fans (does not affect the power supply fans).
SCSI ID Setup	Change the ID of the selected slot (valid ID's are between 0-15).
Slot Operation	Set or clear slot status flags.
Global Command	Set or clear global enclosure flags.
Firmware Options	Allows for firmware upgrades and permanent setting changes.
Display cdb Window	Reserved.
Host/target Menu	Returns to Main Screen.
Web Service	Allows for enclosure monitoring over internet/intranet applications (additional software required).



The *Inquiry Screen* lists some of the settings of the unit that may be useful during troubleshooting. The Vendor ID, Product ID, and Product Revision Level are shown at the bottom of the screen.

When troubleshooting, it is important to check that the Product Revision Level is at the most recent. In the example, the product revision level shown is 1.00.



The *Enclosure Config Screen*, shows what components the enclosure has been setup to recognize. Components listed include Fans, Power Supplies, Canister Slots, Door Lock, Temperature Sensors, and Speaker. This screen does not show the status of these components, the Enclosure Status Screens will show status.



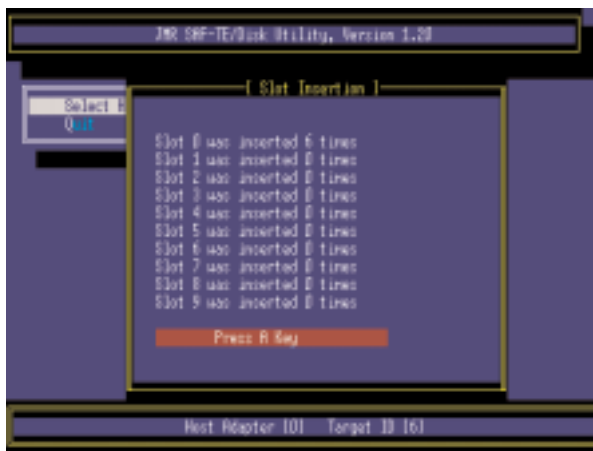
It is important to note that the enclosure has been programmed with the information on this screen and that information can be changed using the Firmware Option menu if a different setup is required. For example; If a power supply is removed, the enclosure configuration will still report that the number of power supplies is '2'.



The *Enclosure Status Screen*, will report the status of the blowers, power supplies, slot SCSI ID's, system temperature, and slot temperature. The *Usage Statistics Screen*, will report how many hours the system has been in operation for and how many times it has been turned on and off.



The *Device Insertion Screen*, show how many times a device has been inserted into each slot.



The *Slot Status Screen*, will report what the status of each slot is. For testing purposes, the slot status may be set and cleared from the Slot Operation menu.



The *Power Supply Ena/Dis Screen*, allows each power supply to be turned off (disable), or turned on (enable). From the rear of the unit, power supply 1 is on the left hand side, and power supply two is on the right hand side.



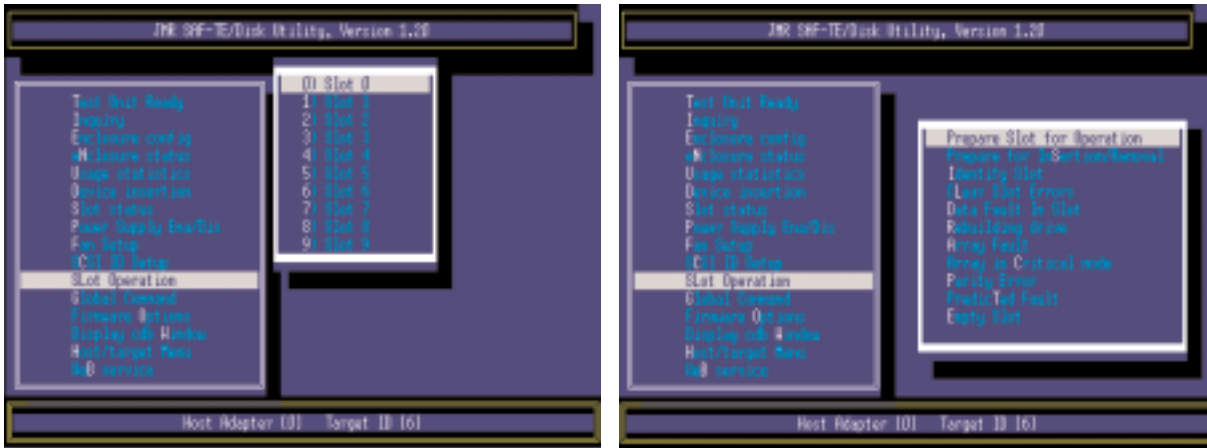
The *Fan Setup Screen*, allows for manual control of the blowers. Individual blower control is not available so using these commands will set both blowers at the same time.



The *SCSI ID Setup Screen*, allows each slot ID to be changed on-the-fly. Any changes to these settings will be saved to the unit upon exiting the program. SCSI ID's can be viewed using the **Enclosure Status** menu. This menu screen has two submenus; on the first submenu, the slot must be selected as shown on the left screen. On the second submenu, the new ID for the selected slot must be chosen. Use the ESC key to back out of the menu if an incorrect choice is selected. After changing the ID, go to the Enclosure Status menu to ensure that it has been changed successfully.



The *Slot Operation Screen*, allows flags to be set for each individual slot. The menu has two submenus; first select the slot and second, select the operation to be performed on the selected slot. After a selection of the slot, status may be checked in the *Slot Status Screen*. The first four commands are important to canister operation and the rest of the commands are for test purposes. *Prepare Slot for Operation* turns the slot on. *Prepare for Insertion/Removal* turns the slot off. *Identify Slot* will blink the activity LED on the particular slot so that the canister can be easily located. *Clear Slot Errors* removes all flags from the slot and clears all errors to the slot.



The *Global Command Screen*, has several flags that may be set that affect the entire enclosure, not just a particular slot. The first two commands are important to unit operation and the rest of the flags are mainly used for test purposes. *Clear Global Errors* will clear any enclosure error flags that have been set



The *Firmware Options* screen is used to read the current firmware settings of the unit and to load new settings into the unit from disk.



The *Display EEPROM* command will show the current firmware settings. *Display disk File* will load an EEPROM file from a disk and display it to the screen. *Save EEPROM to disk* will

save the current firmware in the unit to a disk. *Load EEPROM from disk* will load the EEPROM file from a disk and save it in the unit as the new active firmware. The *Program EEPROM with default* command will restore factory default settings to the unit. See the section **Updating Firmware**, for specific information on using these commands and changing firmware settings.

Updating Firmware

To change enclosure settings including unit SAF-TE ID, default boot options, and to upgrade the firmware, a **Firmware Option** menu, seen above, is provided in the utility software.

To modify existing settings, the settings file (Eetbl.asm) on the utility disk must be edited to the required settings and then loaded into the unit EEPROM using the *Load EEPROM from Disk* command from the **Firmware Option** menu. The setting file, *Eetbl.asm*, is shown with detailed descriptions below. The HEADING column may be disregarded. The LINE column does not exist in the file and has been added so that reference to specific rows can be made for instructional purposes only. Use a text editor to change the value in the SETTING column, save the file, and then load the file into the EEPROM from the Firmware Options menu. The DESCRIPTION column contains no setting values and anything after the semi-colon is a comment in the file.



EETBL.ASM Default Settings File

LINE	HEADING	SETTING	DESCRIPTION
1	EEDFTTBL: DB	85	;55H CHECKSUM
2	DB	255	;OFFH
3	DB	0	;NONE = 0, MASTER = 1, SLAVE = 2
4	DB	10	;NUMBER OF CANISTERS
5	DB	11	;CANISTER SETTINGS WITH-OUT ID
6	DB	5	;SAF-TE SCSI ID
7	DB	255	;SPIN-UP TIME LOW BYTE
8	DB	32	;SPIN-UP TIME HIGH BYTE
9	DB	5	;TEMP CALIBRATION VALUE (RESERVED)
10	DB	0	;KEYBOARD LOCK (NOT USED)
11	DB	0	;SLOT 0 SCSI ID
12	DB	1	;SLOT 1 SCSI ID
13	DB	2	;SLOT 2 SCSI ID
14	DB	3	;SLOT 3 SCSI ID
15	DB	4	;SLOT 4 SCSI ID
16	DB	0	;SLOT 5 SCSI ID
17	DB	1	;SLOT 6 SCSI ID
18	DB	2	;SLOT 7 SCSI ID
19	DB	3	;SLOT 8 SCSI ID
20	DB	4	;SLOT 9 SCSI ID
21	DB	5	;SLOT 10 SCSI ID
22	DB	8	;SLOT 11 SCSI ID
23	DB	9	;SLOT 12 SCSI ID
24	DB	10	;SLOT 13 SCSI ID
25	DB	11	;SLOT 14 SCSI ID
26	DB	5	;SLOT 15 SCSI ID
27	DB	8	;SLOT 16 SCSI ID
28	DB	9	;SLOT 17 SCSI ID
29	DB	10	;SLOT 18 SCSI ID
30	DB	11	;SLOT 19 SCSI ID
31	DB	12	;SLOT 20 SCSI ID
32	DB	13	;SLOT 21 SCSI ID
33	DB	14	;SLOT 22 SCSI ID
34	DB	12	;SLOT 23 SCSI ID
35	DB	13	;SLOT 24 SCSI ID
36	DB	14	;SLOT 25 SCSI ID
37	DB	0	;LSB NUMBER OF POWER ON MINUTES
38	DB	0	; NUMBER OF POWER ON MINUTES
39	DB	0	; NUMBER OF POWER ON MINUTES
40	DB	0	;MSB NUMBER OF POWER ON MINUTES
41	DB	0	;NUMBER OF INSERTION IN SLOT 0 LSB BYTE
42	DB	0	; MSB BYTE
43	DB	0	;NUMBER OF INSERTION IN SLOT 1 LSB BYTE




```

44      DB      0      ;      MSB BYTE
45      DB      0      ;NUMBER OF INSERTION IN SLOT 2 LSB BYTE
46      DB      0      ;      MSB BYTE
47      DB      0      ;NUMBER OF INSERTION IN SLOT 3 LSB BYTE
48      DB      0      ;      MSB BYTE
49      DB      0      ;NUMBER OF INSERTION IN SLOT 4 LSB BYTE
50      DB      0      ;      MSB BYTE
51      DB      0      ;NUMBER OF INSERTION IN SLOT 5 LSB BYTE
52      DB      0      ;      MSB BYTE
53      DB      0      ;NUMBER OF INSERTION IN SLOT 6 LSB BYTE
54      DB      0      ;      MSB BYTE
55      DB      0      ;NUMBER OF INSERTION IN SLOT 7 LSB BYTE
56      DB      0      ;      MSB BYTE
57      DB      0      ;NUMBER OF INSERTION IN SLOT 8 LSB BYTE
58      DB      0      ;      MSB BYTE
59      DB      0      ;NUMBER OF INSERTION IN SLOT 9 LSB BYTE
60      DB      0      ;      MSB BYTE
61      DB      0      ;NUMBER OF INSERTION IN SLOT 10 LSB BYTE
62      DB      0      ;      MSB BYTE
63      DB      0      ;NUMBER OF INSERTION IN SLOT 11 LSB BYTE
64      DB      0      ;      MSB BYTE
65      DB      0      ;NUMBER OF INSERTION IN SLOT 12 LSB BYTE
66      DB      0      ;      MSB BYTE
67      DB      0      ;NUMBER OF INSERTION IN SLOT 13 LSB BYTE
68      DB      0      ;      MSB BYTE
69      DB      0      ;NUMBER OF INSERTION IN SLOT 14 LSB BYTE
70      DB      0      ;      MSB BYTE
71      DB      0      ;NUMBER OF INSERTION IN SLOT 15 LSB BYTE
72      DB      0      ;      MSB BYTE

```

Important Settings

Line 6: Contains the default SAF-TE SCSI ID for the enclosure.

Line 11 - 36: Contains default canister SCSI ID settings for the enclosure

(Lines 11 - 20 are for Slots 0-9, the remaining 21 - 36 lines are not typically used)

Line 37 - 40: Contains the amount of power on time

Line 41 - 72: Contains the number of insertions per slot

SAF-TE Commands

This section covers the SAF-TE commands that are implemented in the enclosure. The SAF-TE Processor in the enclosure is referred to as the SEP. It is possible that some of the commands may also be accessed through a host controller menu if the host controller has implemented the same commands. The commands that are not marked with a '*' are mandatory SAF-TE commands and must be implemented by the host adapter for basic communication to the enclosure.

Not all of the commands listed here are required to be implemented in order to be SAF-TE compliant. The commands that are optional and are not required in order to meet the SAF-TE specification but are specified within the specification have been marked with a '*' before the



command. JMR Electronics, Inc. has implemented all of the SAF-TE commands in the SAF-TE specification including the optional commands, to ensure compatibility with other vendors. All of the SAF-TE commands can be accessed through the utility software even if the host adapter has not implemented it or does not support the command.

SAF-TE does not require that any additional cabling be installed between the enclosure and the host. Since the enclosure is assigned an ID on the SCSI bus, all of the communication between the host and enclosure takes place over the SCSI bus. For SAF-TE to function, both the enclosure and the host adapter must support the SAF-TE specification and be connected on the same bus in order to communicate. The SEP in the enclosure is a passive target and will not execute these commands unless an initiator host controller requests it.

Perform Slot Operation Command

Perform slot operation is a mandatory SAF-TE command that is used to perform various operations on device slots. The available operations are listed below.

Prepare for operation

Requests that the enclosure SEP should take any action required to make the device in the selected slot available on the SCSI bus. This powers up the slot.

Prepare for insertion or removal

Requests that the enclosure SEP should take any action required to allow the safe physical insertion or removal of a device from the selected slot. This powers down the slot.

Identify

Requests that the enclosure SEP should indicate the physical location of the selected slot. This causes the selected slot activity LED to blink.

Read Device Slot Status Command

Read device slot status is a mandatory SAF-TE command that returns information on the current state of each drive/slot. The available status reports are described below:

Device Inserted

Reports whether or not there is a physical device inserted in the slot selected.

Ready for Insertion/ Removal

Reports whether or not the slot is ready for the physical insertion or removal of a device.

Prepared for Operation

Reports whether or not the slot is activated so that the inserted drive may be accessed on the SCSI bus.



Read Enclosure Configuration Command

Read enclosure status is a mandatory SAF-TE command that reports to the host what components are installed in the enclosure. This will only read the unit that the SEP is installed on, not any unit connected via S-Link. The components that can be monitored are listed below:

Number of Fans

Reports the number of currently installed cooling fans.

Number of Power Supplies

Reports the number of currently installed power supplies.

Number of Device Slots

Reports the total number of device slots available in the unit whether or not a device is inserted.

Door Lock Installed

Reports whether or not a door lock is installed. If there is a lock installed, the remote lock/unlock feature is a manual procedure and is not host-controllable.

Number of Temperature Sensors

Reports the number of temperature sensors installed.

Speaker Installed

Reports if a speaker or buzzer is installed in the unit.

Read Enclosure Status Command

Read enclosure configuration is a mandatory SAF-TE command. This command is used to find the status of the enclosure components that are listed by the 'Read Enclosure Configuration Command'. The components and possible status values are listed below:

Blower	Power Supply	Slot SCSI ID	Door Lock	Speaker	Temperature
Operational	Operational and on	Slot 'x' = SCSI ID 'x'	Installed	Off	Temperature in Fahrenheit from -10 to 245
Malfunctioning	Operational and off		Not Installed	On	Out of Range
Not Installed	Malfunctioning and commanded on				
Unknown	Malfunctioning and commanded off				
	Not Present				
	Present (on or off)				
	Unknown				



Send Global Command

Send global command is a mandatory SAF-TE command that is used to send commands that apply to the entire enclosure globally rather than to a specific device, channel, or device slot. Global commands set a flag on the enclosure SEP that can give several results as listed below:

SYSTEM FAULT	Indicates that a global error condition has occurred as determined by the host adapter.
WARNING FAULT	Condition is determined by the host adapter.
COOLING FAULT	Indicates that a blower/temperature failure has occurred.
POWER SUPPLY FAULT	Indicates that system power has been lost.
DRIVE FAULT	Indicates that a drive has failed.
DRIVE 'x' FAULT	Indicates that a potential error has or may have occurred on a drive.
ARRAY FAULT	Indicates that an array has failed.
CRITICAL FAULT	Indicates that an array is not fault-tolerant.

Write Device Slot Status Command

Write device slots status is a mandatory SAF-TE command. These commands affect the device slots and can only be set from a host adapter. Device Slot Status commands set a flag on the enclosure SEP that can give several results as listed below:

ARRAY FAULT IN SLOT 'x'	Indicates a member of the array has an error.
CRITICAL FAULT IN SLOT 'x'	Indicates that the device is in an array that has become non-fault tolerant.
DATA PARITY FAULT IN SLOT 'x'	Indicates the device is in an array which is undergoing a parity check operation.
DATA TRANSFER FAULT IN SLOT 'x'	Indicates that the device has exhibited some hardware or data fault.
NO DRIVE FAULT IN SLOT 'x'	Indicates that the slot has no drive inserted.
PREDICTED FAULT IN SLOT 'x'	Indicates that the device has been tagged by a fault prediction algorithm as being likely to fail in the near future.
REBUILDING DRIVE IN SLOT 'x'	Indicates that the device is being rebuilt.



Optional SAF-TE Commands

****Activate Power Supply Command***

Activate power supply is an optional SAF-TE command that is used to turn the selected power supply on or off.

****Read Device Insertions Command***

Read device insertions is an optional SAF-TE command that returns information indicating how many times a device has been inserted into each slot in the enclosure while it was powered on.

****Read Usage Statistics Command***

Read usage statistics is an optional SAF-TE command that is used to receive information on total usage time and number of power-on cycles of the enclosure. Information supplied by the enclosure to the host is described below.

Total Number of Power on minutes

Reports the total number of minutes that the enclosure has been powered on. This number is cumulative over the life of the unit.

Total number of power on cycles

This counts the number of times that the enclosure has been powered on. This number is cumulative over the life of the unit.

****Set SCSI ID Command***

This is an optional SAF-TE command that is used to set the SCSI bus ID of any device slot the SEP can communicate with. Changing a device SCSI ID to an already used SCSI ID will result in the SAF-TE processor automatically selecting an unused ID. The bus may need to be rescanned by the host controller before the new ID is recognized.

****Set Fan Speed Command***

This is an optional SAF-TE command that is used to set the fan speed. The fan speed settings are listed below.

- 0 - 0% of capacity
- 1 - 25% of capacity
- 2 - 50% of capacity
- 3 - 75% of capacity
- 4 - 100% of capacity



10. Product Support

For current information on this product, including updates to the manual and technical support related issues, please contact the sales support section of our web page at www.jmr.com, or you can contact our Technical Support division directly at the address below.

US Corporate Headquarters

JMR Electronics, Inc.

ATTN: Technical Support Division

20400 Plummer St.

Chatsworth, CA 91311

Customer Support: (818) 739-1140

E-mail: techsupport@jmr.com

Office Hours: Monday-Friday 8:00 A.M. to 5:00 P.M., Pacific Standard Time

Internet: <http://www.jmr.com>

Manual Changes

Revision A - Initial Release.

Revision B - Major reformatting

Revision C - Completely changed formatting.



Appendix A. Drive and Controller Manufacturers

Drive Manufacturers

Fujitsu

Internet Address: www.fcpa.com

Hitachi

Internet Address: www.hitachi.com

IBM (International Business Machines Corporation)

Internet Address: www.ibm.com

Maxtor

Internet Address: www.maxtor.com

Seagate Technology

Internet Address: www.seagate.com

RAID Controller Manufacturers

Adaptec, Inc.

Internet Address: www.adaptec.com

Chaparral Network Storage

Internet Address: www.chaparralnet.com

Digi-Data Corporation

Internet Address: www.digidata.com

Infortrend Corporation

Internet Address: www.infortrend.com

Intel ICP VORTEX (Intelligent Computer Peripherals)

Internet Address: www.icp-vortex.com

Mylex Corporation

Internet Address: www.mylex.com

Silicon Image, CMD Storage Systems

Internet Address: www.cmd.com





Host Bus Adapter Manufacturers

Adaptec, Inc.

Internet Address: www.adaptec.com

Antares Microsystems

Internet Address: www.atares.com

Emulex Corporation

Internet Address: www.emulex.com

JNI Corporation

Internet Address: www.jni.com

QLogic Corp.

Internet Address: www.qlogic.com

